

**RECOVERY PROGRAM  
FY 2020-2021 SCOPE OF WORK for:**

Recovery Program Project Number: 138

Annual fall monitoring of young-of-year Colorado pikeminnow and small-bodied native fishes, Colorado pikeminnow broodstock collection, and database management

Reclamation Agreement number: R19AP00059  
Reclamation Agreement term: Oct. 1, 2019 – Sept. 30, 2024

Note: Recovery Program FY20-21 scopes of work are drafted in May 2019. They often are revised before final Program approval and may subsequently be revised again in response to changing Program needs. Program participants also recognize the need and allow for some flexibility in scopes of work to accommodate new information (especially in nonnative fish management projects) and changing hydrological conditions.

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<u>Category:</u>	<u>Expected Funding Source:</u>
<input type="checkbox"/> Ongoing project	<input checked="" type="checkbox"/> Annual funds
<input checked="" type="checkbox"/> Ongoing-revised project	<input type="checkbox"/> Capital funds
<input type="checkbox"/> Requested new project	<input type="checkbox"/> Other [ <i>explain</i> ]
<input type="checkbox"/> Unsolicited proposal	

I. Title of Proposal: Annual fall monitoring of young-of-year Colorado pikeminnow and small-bodied native, Colorado pikeminnow broodstock collection, and database management

II. Relationship to RIPRAP:

GENERAL RECOVERY PROGRAM SUPPORT ACTION PLAN

- V. Monitor populations and habitat and conduct research to support recovery actions (research, monitoring, and data management).
- V.B.2. Conduct appropriate studies to provide needed life history information.
- IV.A.4.d(1) Upper Colorado River Basin (Broodstock currently represented at Southwest Native ARRC and by wild fish in the river.)

#### GREEN RIVER ACTION PLAN: MAINSTEM

- V. Monitor populations and habitat and conduct research to support recovery actions (research, monitoring, and data management).
- V.C.3. Monitor age-0 Colorado pikeminnow in backwaters.

#### COLORADO RIVER ACTION PLAN: MAINSTEM

- V. Monitor populations and habitat and conduct research to support recovery actions (research, monitoring, and data management).
- V.A. Conduct research to acquire life history information and enhance scientific techniques required to complete recovery actions.

### III. Study Background/Rationale and Hypotheses:

Early life-stage Colorado pikeminnow (*Ptychocheilus lucius*) monitoring is an ongoing effort in the Green River basin to evaluate spawning success. Monitoring of juvenile Colorado pikeminnow occurs in conjunction with adult population estimates in the Green and Colorado rivers. However, survival of young-of-year (YOY) can vary greatly between years independent of spawning success and can have an impact on the juvenile component of Colorado pikeminnow populations. For example, biotic and abiotic factors such as flow variation, backwater temperatures, competition and predation by nonnative fish (e.g., piscivores and small-bodied cyprinids), and over-winter mortality can hinder age-0 survival, resulting in a smaller number of juvenile Colorado pikeminnow available for recruitment into the adult population (Bestgen et al. 2006; Bestgen and Hill 2016; Breen and Jones 2019). Recruitment of other native species such as bluehead sucker (*Catostomus discobolus*), flannelmouth sucker (*C. latipinnis*), roundtail chub (*Gila robusta*), and speckled dace (*Rhinichthys osculus*) is affected similarly.

As a result of decreased recruitment, control actions targeting nonnative piscivorous species, primarily smallmouth bass (*Micropterus dolomieu*), northern pike (*Esox lucius*), and walleye (*Sander vitreus*), are being evaluated across the upper Colorado River basin to determine the level of reduction necessary to minimize the threat to the recovery of Colorado pikeminnow and other endangered Colorado River fishes. Successful implementation of nonnative fish removal will likely be measured by the response of endangered fish and other native species (i.e., increased abundance), and will likely be evident in early life-stages of the native fish community (Bestgen et al. 2007a). An adult response to nonnative removal may not be detectable initially for a number of reasons (e.g., Skorupski et al. 2012), including large home range of adults and slow maturation. Furthermore, a positive response by adult endangered species may be difficult to measure statistically without extensive observations due to generation times of endangered fish populations (e.g., Bestgen et al. 2007b).

Data necessary to evaluate the recovery status of Colorado pikeminnow will be generated by current and future YOY sampling conducted during this project. For instance, documenting size and relative abundance of YOY Colorado pikeminnow and other native species (e.g., UDWR 2006) may provide valuable information about the probable survival of any particular year class. Together with existing YOY data compiled from the Interagency Standardized Monitoring Program (ISMP; 1987–present), results from this project should provide the basis for monitoring distribution and recruitment rates of YOY Colorado pikeminnow. Additionally, this project ensures continuation of existing, standardized data series (ISMP) that document trends in abundance of early-life stage Colorado pikeminnow (USFWS 1987).

Maintaining a healthy and robust Colorado pikeminnow broodstock has been identified as a priority in both the upper Colorado and San Juan River basins, and may be necessary given recent declines in the Green River basin. Southwestern Native Aquatic Resource and Recovery Center (SNARRC) has requested 1,000 individual YOY Colorado pikeminnow for broodstock augmentation purposes. Ideally, equal numbers of pikeminnow will be collected from each of the three nursery habitat reaches (middle and lower Green River and lower Colorado River), over approximately five years. This effort is needed to improve the genetic diversity of captive pikeminnow populations.

#### IV. Study Goals, Objectives, End Product(s):

##### Goal:

Monitor YOY Colorado pikeminnow to assess long-term trends in annual fall recruitment, improve genetic diversity for captive Colorado pikeminnow populations, and enhance database and reporting efficiency and effectiveness using R.

##### Objectives:

1. Determine size and relative abundance of YOY Colorado pikeminnow and small-bodied native fishes at the end of their first growing season to complement larval and juvenile sampling data.
2. Collect YOY Colorado pikeminnow from three nursery habitat reaches and transport them to SNARRC for broodstock augmentation purposes.
3. Enhance the value of the database by uploading data, using R to create tools that allow Principal Investigators to create annual reports in a consistent and informative manner and providing QAQC.

##### End product:

Continuation of long-term data collection for YOY pikeminnow and associated habitat information; findings will be reported annually. Broodstock enhancement data will also be included in the UCRRP Project #138 annual report.

From 2005–2018, this project consisted of sampling a third backwater habitat in each five mile

sub-reach in the middle Green River (Breen and Michaud 2018) in order to determine a native fish response (originally UCRRP Project #144). However, a true native fish response to nonnative fish removal is not possible in the middle Green River because treatment and control reaches do not exist as in a similar study conducted in the Yampa River (Bestgen et al. 2007; Skorupski et al. 2012). Recently, a backwater survival study conducted from 2009–2012 (UCRRP Project #158) provided additional insights on factors affecting age-0 Colorado pikeminnow recruitment in middle Green River backwaters (Breen and Jones 2019). More specifically, this study concluded that predation by nonnative piscivores entering backwater nursery areas from riverine habitats is a significant threat to age-0 native fishes. As such, a final recommendation (approved at the March 4-5, 2019 Biology Committee meeting) was to replace sampling of a third backwater with a summer sampling regime to evaluate diel movement in and out of backwaters by deploying fine mesh directional fyke nets. In addition to determining changes in the fish community following the larval drift period, this investigation will allow us to better understand the dynamics and extent of nonnative fishes moving between riverine and backwater habitats to forage on native fishes. Therefore, we will no longer sample a third backwater in the middle Green River for this project and will be adding a task to UCRRP Project #158 to examine backwater habitat predation.

## V. Study Area:

The study area for this project includes identified Colorado pikeminnow nursery habitat areas in the Green and Colorado rivers in Utah (Valdez et al. 1982; Archer et al. 1985; Tyus and Haines 1991). Specifically, Split Mountain to Sand Wash (RM 319–RM 215) on the middle Green River, Green River State Park to the confluence with the Colorado River (RM 120–RM 0) on the lower Green River, and Cisco to the confluence with the Green River (RM 111–RM 0) on the Colorado River.

## VI. Study Methods/Approach:

Annual YOY Colorado pikeminnow and small-bodied native fish sampling will be conducted from mid- to late-September. The first two backwater/low velocity habitats that meet ISMP protocols encountered every five river miles will be sampled dependent upon availability of suitable habitats within each 5-mile sub-reach. Field sampling will be conducted using the ISMP protocol (USFWS 1987) so that long-term trends can be maintained. More specifically, backwater/low velocity habitats will be sampled using a 1.2 m x 4 m seine with 3 mm mesh. At least two non-overlapping seine hauls will be conducted in each habitat sampled (or one seine haul if 25% of the habitat is sampled). Seine hauls will be parallel to one another and perpendicular to the axis of the backwater. However, if water depth is too great seine hauls will be completed along one shoreline. The first two seine hauls in each of the two habitats sampled per sub-reach will be taken at  $\frac{1}{3}$  and  $\frac{2}{3}$  the distance from the mouth of the backwater. Additional seine hauls may be completed in any portion of the backwater including the mouth or shallow tail end. Length of each seine haul, maximum depth, and average depth will be recorded for each sample. All endangered and native fishes will be enumerated, identified, measured (total length in mm), and returned alive to the habitat. Fin ray counts will be completed for all chubs (*Gila* spp.) captured. All nonnative fishes will be enumerated (first

seine haul only) and removed. In subsequent seine hauls, common (i.e., highly abundant) nonnative species will be ignored and other less common nonnative species will be enumerated.

In addition, physical habitat measurements to be collected at each site include habitat type, habitat length, habitat width, backwater temperature, main channel temperature, backwater turbidity, and main channel turbidity. Location of each habitat will be recorded as the approximate river mile and in UTM coordinates using GPS technology.

Utah Division of Wildlife Resources will coordinate with SNARRC to collect YOY Colorado pikeminnow from the Green and Colorado rivers to augment the captive broodstock. Collection will occur in the fall and will be triggered by presence of a strong cohort (determined during summer and early fall sampling under UCRRP Projects #160 and #138). Collection may not occur every year and will continue until target numbers are reached for each river.

We will use R to analyze data on a broad geographic scale, specifically in the area of nonnative fish to allow for better adaptive management. We will work with CNHP to determine the best way for these tools to get data from the database without introducing data corruption or security risks. During this process, we will QAQC data to ensure tools work properly. If possible within the scope, we will provide training to other PIs to ensure that everyone knows what tools are available and how they can be used.

VII. Task Description and Schedule:

Task 1. Seine backwater/low velocity habitats to collect data for endangered, native and nonnative fish; collect physical habitat data: middle Green River. (UDWR–Vernal).

Task 2. Seine backwater/low velocity habitats to collect data for endangered, native and nonnative fish; collect physical habitat data: lower Green River and lower Colorado River (UDWR–Moab).

Task 3. Data entry, analysis, and report preparation (UDWR–Vernal and UDWR–Moab).

Task 4. Colorado pikeminnow broodstock collection (UDWR–Moab)

Task 5. Database management for UCREFRP (UDWR-Moab)

Task	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
1									X			
2									X			
3										X	X	X
4									X	X		
5	X	X	X	X	X							

VIII. Deliverables, Due Dates, and Budget by Fiscal Year:

FY 2020-2024

Program annual reports due each November.

Project data will be submitted to the Recovery Program Database Manager by January.

In addition to annual reports, the PIs will submit a short article and photos for inclusion in the 2020 *Swimming Upstream* field report.

IX. Budget Summary:

	<b>UDWR- Moab</b>	<b>UDWR- Vernal</b>	<b>FY Total</b>
<b>FY 2020</b>	\$53,542	\$28,004	\$81,546
<b>FY 2021</b>	\$39,054	\$28,564	\$67,618
<b>FY 2022</b>	\$39,835	\$29,135	\$68,970
<b>FY 2023</b>	\$40,632	\$29,718	\$70,350
<b>FY 2024</b>	\$41,444	\$30,312	\$71,756
<b>TOTAL</b>	<b>\$214,506</b>	<b>\$145,733</b>	<b>\$360,239</b>

X. Reviewers:

XI. References:

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- Valdez, R., P. Mangan, R. Smith, and B. Nilson. 1982. Upper Colorado River investigation (Rifle, Colorado to Lake Powell, Utah). Pages 101-279 in W.H. Miller et al., editors. Colorado River Fishery Project Final Report; Part Two, Field Studies. U.S. Fish and Wildlife Service and Bureau of Reclamation. Salt Lake City, Utah.
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- USFWS. 1987. Interagency standardized monitoring protocol handbook. U.S. Fish and Wildlife Service. Grand Junction, Colorado.